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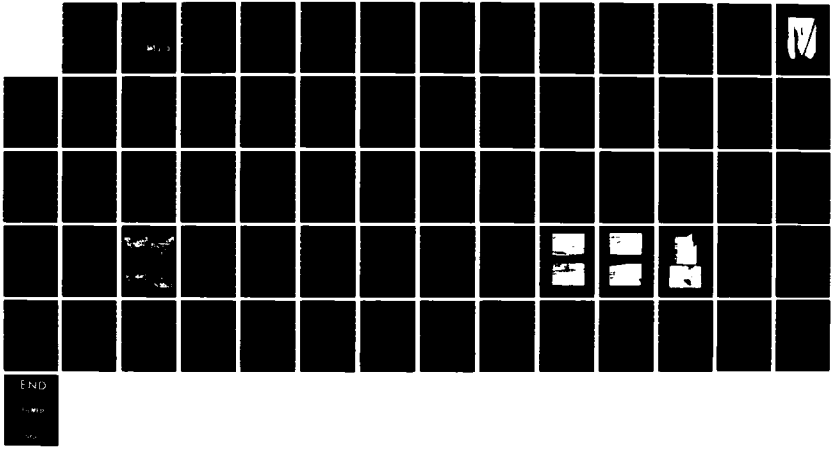

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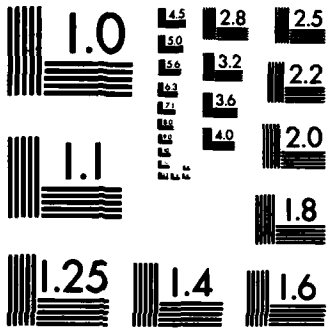

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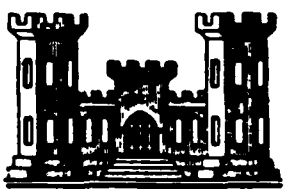
CONNECTICUT RIVER BASIN

WHITINGHAM, VERMONT

JACKSONVILLE POND DAM
VT 00148

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASS. 02154

JANUARY 1981

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4. TITLE (and Subtitle) Jacksonville Pond Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,
Connecticut River Basin
Whitingham, VT.
Tributary to East Branch North River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

THe dam is a concrete and stone masonry structure. The dam is judged to be in fair condition. There is no means available for drawing down the pool level if an emergency situation were to occur. It is small in size with a high hazard potential. The test flood is equal to the full PMF. There are various remedial measures which should be undertaken by the owner.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:
NEDED

JUN 16 1981

Honorable Richard A. Snelling
Governor of the State of Vermont
State Capitol
Montpelier, Vermont 05602

Dear Governor Snelling:

Inclosed is a copy of the Jacksonville Pond Dam (VT-00148) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Water Resources, the cooperating agency for the State of Vermont. In addition, a copy of the report has also been furnished the owner, Town of Whitingham, VT.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Water Resources for your cooperation in carrying out this program.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

Incl
As stated

JACKSONVILLE POND DAM
VT 00148

CONNECTICUT RIVER BASIN
JACKSONVILLE, VT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION
PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

BRIEF ASSESSMENT

IDENTIFICATION NO:	VT 00148
NAME OF DAM:	Jacksonville Pond Dam
TOWN:	Whitingham
COUNTY AND STATE:	Windham, Vermont
STREAM:	Tributary to East Branch North River
DATE OF INSPECTION:	November 11, 1980

Jacksonville Pond Dam is a concrete and stone masonry structure. The dam is about 80 feet long and has a maximum height of about 14 feet. The central portion of the dam, which also comprises the 33.8-foot long spillway overflow section, is dry stone masonry construction with earthen fill on the upstream side. Concrete abutment and cutoff walls are located at each abutment. There are no operable outlet facilities at the dam. The dam was originally a mill dam, but it is now used as a source of water for fire protection.

Based on visual inspection, the dam is judged to be in fair condition. The long-term stability of the dam could be affected by seepage discharging from beneath the downstream closure of what was apparently a sluiceway at one time, by surface erosion near the concrete walls that extend from the ends of the dam into the abutments, and by surface erosion on the abutment side of the training wall at the left end of the spillway. There is no means available for drawing down the pool level if an emergency situation were to occur.

Based on the Recommended Guidelines for Safety Inspection of Dams, prepared by the Corps of Engineers, the dam is classified as "small" in size, with a "high" hazard potential. A test flood equal to the Probable Maximum Flood (PMF) was selected for the analyses

performed for this report. The spillway capacity of Jacksonville Pond Dam is 484 cfs, which is about 4 percent of the routed test flood outflow of 11,150 cfs. The test flood would cause the dam to be overtopped by about 8.9 feet.

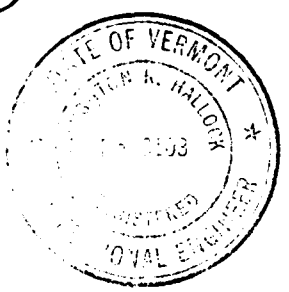
It is recommended that the Owner engage a professional engineer experienced in the design of dams to investigate the seepage at the downstream closure of what was apparently a sluiceway at one time, perform more detailed hydrologic and hydraulic analyses to determine spillway adequacy or the ability of the project to withstand overtopping, and investigate implementation of a low-level drawdown system. In addition, the Owner should make necessary repairs for the deficiencies listed above and should also implement the remedial measures described in Paragraph 7.3.

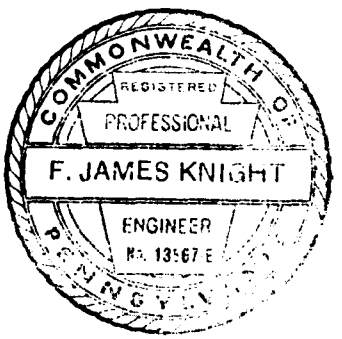
The measures outlined above, and discussed in detail in Section 7, should be implemented within one year after receipt of this Phase I Inspection Report.

GANNETT FLEMING CORDDRY
AND CARPENTER, INC.

Houghton R. Hallock, P.E.

F. James Knight, P.E.
Assistant Vice President
Project Manager





This Phase I Inspection Report on Jacksonville Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in Recommended Guidelines for Safety Inspection of Dams, for a Phase I Investigation. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general conditions and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railing and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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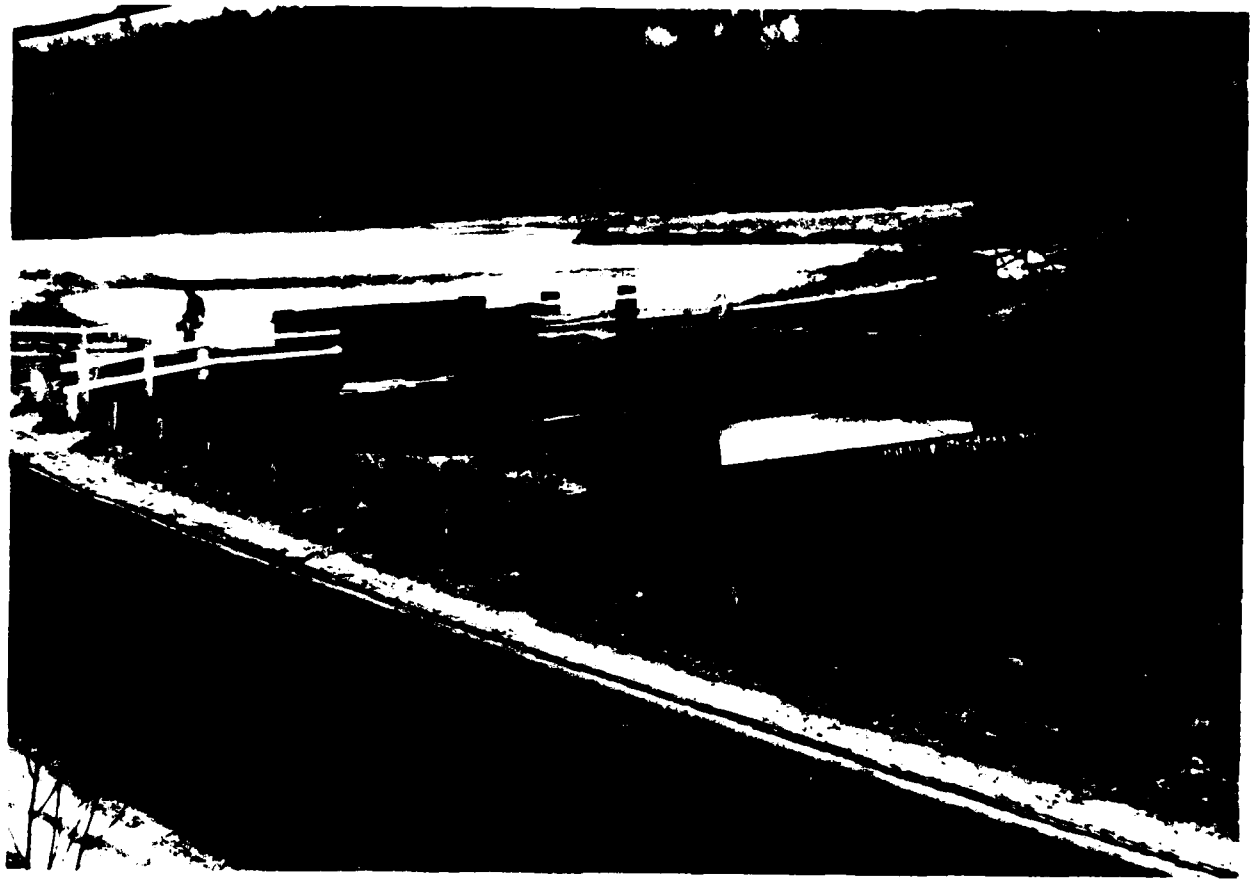
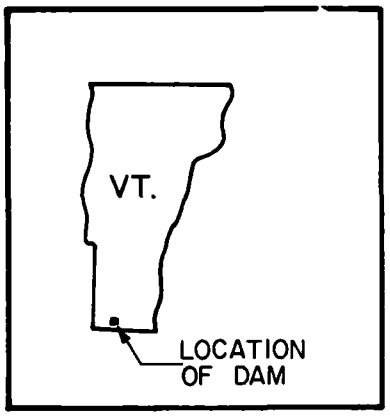
Jacksonville Pond Dam



Overview

FIGURE 1



VICINITY MAP

NOTES:

1. DAM SHOWN ON USGS QUADRANGLE WILMINGTON, VT.
2. DAM LOCATED 5.5 MILES SOUTHEAST OF WILMINGTON, VT.

GANNETT FLEMING CORDDRY AND CARPENTER, INC. *CONSULTING ENGINEERS* BOSTON, MASS.	U. S. ARMY ENGINEER DIVISION NEW ENGLAND *CORPS OF ENGINEERS* WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

JACKSONVILLE POND DAM

LOCATION MAP AND DRAINAGE AREA

DRAWN	CHECKED	APPROVED	SCALE: 1" = 5208'
L.L.R.	D.B.W.	F.J.K.	DATE: 12/80 PAGE V

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
JACKSONVILLE POND DAM

SECTION 1
PROJECT INFORMATION

1.1 General.

a. Authority. Public Law 92-367, dated August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility for supervising the inspection of dams within the New England Region. Gannett Fleming Corddry and Carpenter, Inc., has been retained by the New England Division to inspect and report on selected dams in the States of Vermont and Massachusetts. Contract No. DACW33-81-C-0013 dated November 5, 1980, has been assigned by the Corps of Engineers for this work.

b. Purpose. The purpose of the inspection and evaluation of non-Federal dams is to accomplish the following:

(1) Identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the states to quickly initiate effective dam safety programs for non-Federal dams.

(3) Update, verify, and complete the National Inventory of Dams.

1.2 Description of Project.

a. Location. The dam is located on an unnamed tributary to the East Branch North River and lies entirely within the Town of Whitingham, Vermont. The North River is a tributary of Deerfield River which, in turn, drains to the Connecticut River. The dam is shown on USGS Quadrangle, Wilmington, VT, at latitude N 42° 48' 20" and longitude W 72° 49' 03". The location is shown on Figure 1, page v.

b. Description of Dam and Appurtenances. Jacksonville Pond Dam is a concrete and stone masonry structure. The dam is 80 feet long and has a maximum height of about 14 feet. Details of the dam are shown in Appendix B (Figure 2), on the Overview Photograph, and on the photographs in Appendix C. The dam is comprised of concrete abutment and cutoff wall sections on both the east (left) and west (right) abutments. The central portion of the dam, which also comprises the spillway overflow section, is constructed of dry stone masonry with earthen backfill on the upstream side. The downstream face of the dam is vertical. The upstream face is sloped and not visible or measurable because it is beneath the reservoir pool.

The spillway is a flat, broad-crested weir, constructed of dry stone masonry. The crest is 33.8 feet long and 8.7 feet wide. Discharge over the weir falls vertically onto the rock floor of the stream.

There is no operable outlet to release water from the reservoir. The dam originally supplied water to a mill located approximately 200 feet downstream. On the right abutment the top part of what appears to be a former outlet is visible (Photo No. 5). The downstream portion of the opening is covered with debris and the upstream portion is obscured by the reservoir pool. It appears that the opening has been permanently closed. In addition, a 6-inch diameter steel pipe protrudes from the right abutment concrete section (Photo No. 5). There is no flow from the pipe, and the upstream end is obscured by the reservoir. No valve or gate operating mechanisms are present.

c. Size Classification. Size classification is determined in accordance with Corps of Engineer guidelines and is based on either height or storage capacity, whichever gives the larger size category. Jacksonville Pond Dam has a maximum height of 14 feet and a maximum storage capacity of 113 acre-feet. By virtue of the storage capacity, Jacksonville Pond Dam meets the requirements for a "small" size dam.

d. Hazard Classification. The valley downstream of the dam is steep and in places the stream is incised into bedrock (Photo No. 6). Along the right bank a stone masonry retaining wall about 15 feet high supports a roadway fill and narrows the valley somewhat. Approximately 500 feet downstream from the dam, flow enters the East Branch North River. Several dwellings are constructed very close to the stream, and a number of small, private bridges cross the stream. The first floor

levels of about 10 dwellings are about 5 feet above the streambed. It is estimated that failure of the dam could produce stream depths in excess of 6.7 feet and flow velocities in excess of 12.7 feet per second. Failure of the dam would produce significant property damage and probable loss of more than a few lives. Accordingly, the dam has been placed in the "high" hazard category.

e. Ownership. The dam is owned by the Town of Whitingham. Mr. Finck, Chairman of the Board of Selectmen (802-368-2838) granted permission to enter the property and inspect the dam. Selectman John Brigham accompanied the inspection team.

f. Operator. The dam is operated by personnel from the town under direction of the Board of Selectmen.

g. Purpose of Dam. Jacksonville Pond Dam was originally constructed to supply water to drive a mill. It has long since ceased to serve this purpose. Its only current use is fire protection. The town occasionally fills their tank truck from the reservoir and does have pumping equipment and transmission hose for use in fighting fires in the Village of Jacksonville.

h. Design and Construction History. No historical data concerning Jacksonville Pond Dam is available. Its original construction date is unknown. A report of inspection dated October 10, 1978, is on file in the office of the Vermont Dam Safety Engineer. It notes that dates of 1910 and 1924 are visible on concrete cutoff walls. These dates were observed at the time of this inspection. The 1978 report noted some concrete deterioration in the right abutment section near the now-closed outlet. This condition has subsequently been repaired. No other information concerning Jacksonville Pond Dam is available.

i. Normal Operational Procedures. There are no formal operating procedures. Pool level is controlled by flow over the spillway crest.

1.3 Pertinent Data.

a. Drainage Area. The drainage area for Jacksonville Pond is 5.29 square miles. The terrain is mountainous and is mostly wooded. Two small ponds, Laurel Lake and Gates Pond, are located upstream within the drainage area.

b. Discharge at the Dam. There are no operable outlet facilities for the pond. Normal discharge flows over the ungated, 33.8-foot long spillway (Photo Nos. 2 and 3). Flows have not been recorded at this site and, therefore, the maximum flood discharge is unknown. It was reported verbally that flow overtopped the structure and eroded some soil from the right abutment area several years ago. This section has been repaired, and no indication of such damage was observed. Hydraulic calculations indicate the spillway can discharge 484 cfs when the water level is at the top of the abutment sections. During the test flood (PMF) the peak discharge would be 11,160 cfs with the pond 11.8 feet above the spillway crest.

c. Elevation (feet above NGVD).

(1) Streambed at toe of dam - 1441.2.
(2) Bottom of cutoff - unknown.
(3) Maximum tailwater - 1443.0.
(4) Normal pool - 1452.0.
(5) Full flood control pool - not applicable.
(6) Spillway crest - 1452.0.
(7) Design surcharge (original design) - unknown.
(8) Top of dam - 1454.9.
(9) Test flood surcharge - 1463.8.

d. Reservoir (length in feet).

(1) Normal pool - 1500.
(2) Flood control pool - not applicable.
(3) Spillway crest pool - 1500.
(4) Top of dam - 1500.
(5) Test flood pool - 1500.

e. Storage (acre-feet).

(1) Normal pool - 69.
(2) Flood control pool - not applicable.
(3) Spillway crest pool - 69.
(4) Top of dam - 120.
(5) Test flood pool - 246.

f. Reservoir surface (acres).

(1) Normal pool - 15.
(2) Flood control pool - not applicable.
(3) Spillway crest - 15.
(4) Test flood pool - 15.
(5) Top of dam - 15.

g. Dam.

(1) Type - concrete and stone masonry.
(2) Length - 80 feet.
(3) Height - 14 feet.
(4) Top width - concrete abutment sections - 1.1 feet.
Spillway section - 8.7 feet.
(5) Side slopes - downstream - vertical.
Upstream - unknown.
(6) Zoning - unknown.
(7) Impervious core - unknown.
(8) Cutoff - unknown.
(9) Grout curtain - unknown.

h. Diversion and Regulating Tunnel. Not applicable.

i. Spillway.

(1) Type - broad crested weir, no flashboards.
(2) Length of weir - 33.8 feet.
(3) Crest elevation - 1452.0.
(4) Gates - none.
(5) Upstream channel - reservoir.
(6) Downstream channel - natural streambed incised into rock.

j. Regulating Outlets. None.

SECTION 2

ENGINEERING DATA

2.1 Design Data. No engineering data, design drawings or records are known to exist for Jacksonville Pond Dam.

2.2 Construction Data. No construction records are known to exist.

2.3 Operation Data. No operating records are available.

2.4 Evaluation of Data.

a. Availability. There are no engineering data available for this dam.

b. Adequacy. Not applicable.

c. Validity. Not applicable.

SECTION 3

VISUAL INSPECTION

3.1 Findings.

a. General. The Phase I inspection of the dam at Jacksonville Pond was performed on November 11, 1980. A copy of the inspection checklist is included in Appendix A. A previous inspection was conducted by the State of Vermont, Water Quality Division, on October 6, 1978. A copy of the inspection report is included in Appendix B. Photographs taken during the current inspection are included in Appendix C. A summary of the results of this visual inspection is included in Appendix B (Figure 3).

b. Dam. The dam is founded on bedrock, which outcrops in the channel at the downstream toe of the dam (Photo No. 3). The left abutment is bedrock up to about the elevation of the crest of the spillway weir, and soil from that elevation to the top of the dam. The soil is retained by a roughly-laid, dry stone masonry wall on the downstream side of the dam (Photo No. 3). The right abutment is soil, which also is retained by a roughly-laid, dry stone masonry wall (Photo No. 2). There was no evidence of seepage from the abutments.

A hole in the training wall at the right end of the spillway that was mentioned as the site of leakage in a 1968 inspection report has been patched, and no seepage was emerging there at the time of the inspection (Photo No. 5).

Minor surface erosion of the abutment soil is occurring at the downstream side of the right abutment, on the upstream side of the concrete wall which extends from the dam into the left abutment, and behind the training wall at the left end of the dam (Photo Nos. 1, 2 and 3).

c. Appurtenant Structures. Discharge from the pond is over a 33.8-foot long, dry stone masonry spillway section (Photo Nos. 2 and 3). There are no flashboards on the spillway. The crest of the spillway appears to be smooth and well-aligned. Because of overflowing conditions at the time of the inspection, the structure could not be examined in detail, but it appeared to be in good condition. Water overflowing the spillway section falls directly on sound bedrock in the stream channel. No cracking, weathering or displacement of the foundation was observed.

There is no operable outlet for the reservoir. A former opening in the right abutment section apparently served at one time as a sluice to supply a mill, but it has been closed and does not now permit release of water (Photo No. 5). The mechanism of closure is unknown, since the upstream end is obscured by the reservoir pool and the downstream end by earthfill. About one gallon per minute of clear seepage was observed at the downstream end of the closure. A 6-inch diameter steel pipe also protrudes from the right abutment section but conducts no water. The condition of its upstream end is unknown.

d. Reservoir Area. The area immediately adjacent to Jacksonville Pond is gently sloping and grass-covered. Heavily wooded, steep areas adjoin this shoreline perimeter. A roadway embankment with a bridge opening is located in the reservoir area about 40 feet upstream from the dam (Photo No. 4). The size of the bridge opening and the elevations of the roadway and bridge are such that the structures act as flow controls during periods of large discharge.

e. Downstream Channel. The channel below Jacksonville Pond Dam has approximately the same general cross-sectional dimension as the dam for a distance of about 400 feet (Photo No. 6). Trees overhang both sides of the downstream channel. The channel bottom is bedrock with some boulders. The banks of the channel are retained by dry stone masonry walls immediately downstream of the dam. Beginning about 400 feet downstream, the channel gradually widens and side slopes flatten. About 600 feet below the dam, the stream joins the East Branch North River, and the flow direction changes abruptly.

Several small privately owned bridges cross the stream both above and below its confluence with East Branch North River. Several houses closely border the right bank of East Branch North River. The downstream area is shown in Appendix D (Figure 5).

3.2 Evaluation.

On the basis of the visual inspection, the dam is judged to be in fair condition.

Minor seepage is discharging at the downstream closure of what was apparently a sluiceway at one time. Depending on construction details, this seepage might have an effect on the long-term stability of the right abutment.

Erosion of the soil adjacent to the concrete walls that extend from the ends of the dam into the abutment, and on the abutment side of the training wall at the left end of the dam, might adversely affect the stability of the abutments if it is not controlled.

There is no low-level outlet or other means available for drawing down the pool level. If an emergency situation were to develop, the potential hazard could not be reduced by releasing water from the reservoir.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures.

a. General. The dam is self-regulating and, as such, does not require operation. Personnel from the Town of Whitingham reportedly visit the dam regularly, although there is no formally established schedule for such visits. Members of the Board of Selectmen pass by and observe the dam on a regular basis.

b. Description of any Warning System in Effect. No formal warning system is in effect.

4.2 Maintenance Procedures.

a. General. Several modifications and repairs have apparently taken place, but no formal history or record is available. Minor concrete deterioration noted in the 1978 inspection report has been repaired. Deficiencies have been corrected as they occurred. Generally, the dam is well-maintained.

b. Operating Facilities. No operating facilities exist. An old outlet opening and a 6-inch diameter pipe, both in the right abutment section, have been closed for many years and are no longer operable. The means of closure is unknown.

4.3 Evaluation. Maintenance of the dam is adequate. Although personnel of the Town visit the dam regularly, there is no regular program of technical inspection and no written warning system. This is unsatisfactory considering that the dam is in the high hazard category and considering that the dam is in only fair condition. These programs should be implemented by the Owner as recommended in Section 7.3.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General. Jacksonville Pond Dam has a drainage area of 5.29 square miles. The watershed area is mountainous, mostly wooded, and relatively undeveloped. Two lakes are located within the watershed upstream from Jacksonville Pond. Laurel Lake, located 1.3 miles upstream, has a very small watershed, and it has negligible effects on Jacksonville Pond. Gates Pond, situated just east of Laurel Lake, has a significant watershed area, but it has only very slight storage capacity. As a result, Gates Pond also exerts only minimal influence on Jacksonville Pond Dam. Neither Laurel Lake nor Gates Pond were included in the analysis.

Jacksonville Pond Dam is 13.7 feet high and about 80 feet long. It is an embankment dam with a concrete wall along its upstream side and a dry stone masonry wall along its downstream side. The spillway weir is concrete and is 33.8 feet long. Its width is 8.7 feet. A roadway embankment is located in the reservoir area about 40 feet upstream from the dam. The bridge opening is 17.6 feet wide and 7 feet high. The roadway embankment and the bridge opening act as flow controls for high discharges. The effects of the roadway embankment and the bridge opening were included in the analysis. There is no functional outlet works at the dam. The hydrologic and hydraulic computations performed for this report are included in Appendix D.

5.2 Design Data. There are no hydrologic or hydraulic design data available for the dam.

5.3 Experience Data. There are no records of the maximum discharge at the site. It was reported that "the dam has been overtopped on at least one occasion, and that significant erosion damage occurred from the overtopping."

5.4 Test Flood Analysis. Jacksonville Pond Dam is in the "small" size category and in the "high" hazard category. In accordance with Corps of Engineers' guidelines, a spillway design flood ranging between the one-half Probable Maximum Flood (PMF) and the full PMF should be used to evaluate the spillway. In the following analysis, the PMF was used as the test flood. Conditions for the

one-half PMF were also checked. The test flood (PMF) inflow of 11,638 cfs is based on a watershed area of 5.29 square miles in mountainous terrain. The test flood was routed through Jacksonville Pond. The rating curve used for the dam was a combined curve that accounted for the effects of the upstream roadway embankment and for the roadways that are adjacent to each end of the dam. The routed test flood outflow was determined in accordance with Corps of Engineer Guidance for Estimating Effect of Surcharge Storage on Maximum Probable Discharges. The routing was started with the pool level at the crest of the spillway. The routed test flood outflow was determined to be 11,150 cfs. With the pool level at the top of the dam, the maximum capacity of the spillway is about 484 cfs, which is approximately 4 percent of the routed test flood outflow. The test flood would cause the dam to be overtopped by about 8.9 feet. The depth of overtopping was also checked for the one-half PMF; it was determined to be about 5.2 feet of overtopping.

5.5 Dam Failure Analysis. The impact of failure of the dam was assessed using the "Rule of Thumb" Guidance for Estimating Downstream Dam Failure Hydrographs prepared by the Corps of Engineers. The breach discharge was estimated with the water surface at the crest of the dam and a breach width equal to 40 percent of the mid-height length of the dam. The maximum breach discharge was determined to be 2,728 cfs. The downstream stage was estimated in three reaches.

At the location of the primary damage center, which is in Jacksonville along the East Branch North River, the flood stage resulting from dam failure would be about 6.7 feet. The stage just prior to failure, with the spillway discharging its maximum capacity of 484 cfs, would be about 2.7 feet. Since the first floor levels of about 10 dwellings in this area are about 5 feet above the streambed, the result of dam failure would be severe damage and probable loss of more than a few lives. For this reason, the dam has been placed in the "high" hazard category. The probable flood impact area is shown in Appendix D (Figure 5).

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations. The evaluation of the structural stability of Jacksonville Pond Dam is based on visual observations, there being no available drawings or calculations. As discussed in Section 3, Visual Inspection, the dam is considered to be in fair condition. No structural distress, cracking, or misalignment was observed.

Minor seepage is discharging at the downstream closure of what was apparently a sluiceway at one time. Depending on construction details, this seepage might have an effect on the long-term stability of the right abutment.

Erosion of the soil next to the concrete walls that extend from the ends of the dam into the abutment, and on the abutment side of the training wall at the left end of the dam, might adversely affect the stability of the abutments if it is not controlled.

6.2 Design and Construction Data. No design or construction data for Jacksonville Pond Dam are available.

6.3 Post-Construction Changes. Several generations of concrete work are evident in the abutment sections and cutoff walls. Two of the sections are dated 1910 and 1924. A laid-up stone wall on the right, and a concrete headwall, are believed to have been modified in the early 1960's. No records are maintained and no accurate history of post-construction changes is available.

6.4 Seismic Stability. The dam is located in Seismic Zone 2, and in accordance with Phase I guidelines, does not warrant seismic analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. The visual examination indicates that the dam is in fair condition. The major concerns with respect to the integrity of the dam are:

1) Minor seepage discharging from beneath the downstream closure of what was apparently a sluiceway at one time. Depending on construction details, this seepage might have an effect on the long-term stability of the right abutment.

2) Erosion of the soil next to the concrete walls that extend from the ends of the dam into the abutments and on the abutment side of the training wall at the left end of the overflow spillway. This erosion might adversely affect the stability of the abutments if it is not controlled.

3) Hydraulic analyses indicate that the spillway can discharge 484 cfs with the pool level at the top of the dam. The test flood (PMF) outflow would cause the dam to be overtopped by 8.9 feet. The spillway can discharge about 4 percent of the routed test flood outflow before the dam is overtopped. If the dam were to fail, there would be severe property damage and probable loss of more than a few lives.

4) There is no means available for drawing down the pool level if an emergency situation were to occur.

b. Adequacy of Information. The available information is such that the assessment of this dam must be based primarily on the results of the visual inspection.

c. Urgency. The Owner should implement the recommendations and remedial measures of Paragraphs 7.2 and 7.3 within one year after receipt of this Phase I report.

7.2 Recommendations.

The following investigations and needed corrections should be carried out under the direction of a registered engineer qualified in the design and construction of dams:

1) Investigate the minor seepage at the downstream closure of what was apparently a sluiceway at one time, and design and construct any necessary corrective measures.

2) Perform more detailed hydrologic and hydraulic analyses to determine spillway adequacy or the ability of the project to withstand overtopping.

3) Investigate implementation of a low-level drawdown system.

7.3 Remedial Measures

a. Operating and Maintenance Procedures. The Owner should:

1) Visually inspect the dam once each month.

2) Engage a registered engineer qualified in the design and construction of dams to make a comprehensive technical inspection of the dam once every two years.

3) Establish a surveillance program for use during and after heavy rainfall and a warning program to follow in case of emergency conditions.

4) Repair erosion adjacent to the concrete walls that extend from the ends of the dam into the abutments and at the left end of the spillway.

7.4 Alternatives. There are no practical alternatives to the above recommendations.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT Jacksonville Pond Dam VT 00148 DATE November 11, 1980

TIME a.m.

WEATHER Partly cloudy, cold, breezy

W.S. ELEV. 1452.3 U.S. 1441.5 DN.S.

PARTY:

1. F. James Knight (GFCC)
2. Ronald Hirschfeld (GEI)
3. Dennis Mehue (BAI)
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Geotechnical	Hirschfeld	
2.	Physical/Hydrology	Knight	
3.	Dimensional	Mehue	
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT DATE November 11, 1980

PROJECT FEATURE Dam NAME Knight

DISCIPLINE _____ NAME Hirschfeld

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	1454.9
Current Pool Elevation	1452.0
Maximum Impoundment to Date	Unknown.
Surface Cracks	None apparent.
Pavement Condition	Dry stone masonry wall on downstream side of embankment.
Movement or Settlement of Crest	None apparent.
Lateral Movement	None apparent.
Vertical Alignment	No deficiencies.
Horizontal Alignment	No deficiencies.
Condition at Abutment and at Concrete Structures	Minor surface erosion at right abutment and behind concrete walls.
Indications of Movement of Structural Items on Slopes	None.
Trespassing on Slopes	None.
Sloughing or Erosion of Slopes or Abutments	Minor surface erosion at right abutment.
Rock Slope Protection - Riprap Failures	None.
Unusual Movement or Cracking at or Near Toe	None.
Unusual Embankment or Downstream Seepage	1 gpm clear seepage at old sluiceway location.
Piping or Boils	None.
Foundation Drainage Features	Not applicable.
Toe Drains	Not applicable.
Instrumentation System	Not applicable.
Vegetation	Not applicable.

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT DATE November 11, 1980

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITIONS
DIKE EMBANKMENT	No dike
Crest Elevation	
Current Pool Elevation	
Maximum Impoundment to Date	
Surface Cracks	
Pavement Condition	
Movement or Settlement of Crest	
Lateral Movement	
Vertical Alignment	
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	
Indications of Movement of Structural Items on Slopes	
Trespassing on Slopes	
Sloughing or Erosion of Slopes or Abutments	
Rock Slope Protection - Riprap Failures	
Unusual Movement or Cracking at or Near Toes	
Unusual Embankment or Downstream Seepage	
Piping or Boils	
Foundation Drainage Features	
Toe Drains	
Instrumentation System	
Vegetation	

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT DATE November 11, 1980

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITIONS
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	Not applicable
a. Approach Channel	
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	
Condition of Concrete	
Stop Logs and Slots	

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT DATE November 11, 1980

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITIONS
OUTLET WORKS - CONTROL TOWER	Not applicable
a. Concrete and Structural	
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT DATE November 11, 1980

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITIONS
OUTLET WORKS - TRANSITION AND CONDUIT	Not applicable
General Condition of Concrete	
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT DATE November 11, 1980

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITIONS
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	Not applicable
General Condition of Concrete	
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain Holes	
Channel	
Loose Rock or Trees Overhanging Channel	
Condition of Discharge Channel	

PERIODIC INSPECTION CHECKLIST

PROJECT Jacksonville Pond Dam VT DATE November 11, 1980

PROJECT FEATURE Spillway NAME Knight

DISCIPLINE NAME Hirschfeld

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Good. Highway bridge crosses channel immediately upstream of dam.
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Not visible beneath water surface
b. Weir and Training Walls	
General Condition of Concrete	Good
Rust or Staining	None
Spalling	None
Any Visible Reinforcing	None
Any Seepage or Efflorescence	Minor efflorescence
Drain Holes	None
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Trees overhang channel
Floor of Channel	Bedrock, with some boulders
Other Obstructions	Concrete and masonry walls on sides of channel (remnants of foundation of mill)
Other Comments	

APPENDIX B

ENGINEERING DATA

Public Service [Commission] Board

Hearing on Safety ?

Jacksonville Rind Dem

01-19-49

PSC Case # 2447

Microfilm in Public
Records Division
133 State St. basement

Microfilm in Box PU-211
Location [redacted]
C-7-1

Haybrook's report should be
on microfilm also

VERMONT DEPARTMENT OF WATER RESOURCES

INFORMATION SHEET

Name of Dam Jacksonville Pond Town Whitingham

Owner Town of Whitingham Name of Stream East Branch North T.

Address Wh. Tingham Classification

Vermont

U.S.G.S. Coordinates: Lat. 42° 47' 37" Long. 72° 49' 6"

U.S.G.S. Map Wilmington Aerial Photos VT-62-11 21-146, 147

U.S.G.S. Elev. @ Spillway 1452

Total Length of Dam Crest Width of Emergency Spillway

Width of Top Maximum Height 11'

Spillway Capacity: Principal Emergency

Pond Area Drainage Area

Pond Volume: Normal Water Level Design High Water Level

Maximum Water Depth: Normal Water Level Design High Water Level

Storage Before Emergency Spillway is Used

Use of Reservoir Recreational

Description of Dam: Stone

Description of Spillway(s):

Designed by Year Built

Hearing Date Order Date

Additional Remarks:

STATE OF VERMONT

AGENCY OF ENVIRONMENTAL CONSERVATION

Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources
Environmental Board
Division of Environmental Engineering
Division of Environmental Protection
Natural Resources Conservation Council

ROUTING

GENERAL TO	NOTED	DATE
APB		10/10/78
SIGNATURE		
FILE		

Montpelier, Vermont 05602
Department of Water Resources

WATER QUALITY DIVISION

October 10, 1978

M E M O R A N D U M

To: File

From: A. Peter Barranco, Dam Safety Engineer

Subject: Jacksonville Pond Dam - Whitingham

On October 6 the writer inspected subject structure. Photos and drawings of the dam are attached.

The dam is an unmortared stone structure built on ledge with concrete abutments at both ends. Overall length is 80'. The overflow section is 34' long and about 11' high at maximum height. A 5' wide sluiceway is located at the right side and is comprised of a rather new (date unknown) concrete wall on the left side, a laid up stone wall on the right and a concrete headwall (built in 1961 or 1967) through which is a 6" I.D. iron pipe. The bottom of the sluice is filled with rock and fill and almost completely blocks a 3' wide opening in the headwall which is probably for a gate. A 3" pipe protrudes from the water on the upstream side of the headwall. The purpose of this pipe is unknown although it may be connected toaa gate or to the 6" drain pipe in some fashion.

The dam is in generally good condition (except for the new sluice wall) with no noticeable movement of the vertical downstream face of the overflow section. The concrete walls tying the abutments of the dam into old ground on either side are in fair shape for their age (a 1910 date cut in the right one, a 1924 date in the left one) showing some cracking and leaching but in stable condition.

At the bottom of the new sluice wall adjacent to the 3' wide opening in the headwall, there is a cavity in the concrete about one foot square and a foot deep and a pile of sand and aggregate that has fallen and washed out of it. The concrete is crumbly and appears to have little cement in it. Water is leaking through the cavity and causing the sand and aggregate to wash out. The wall is about 2' thick (from a top measurement) at this point and the cavity is about 7' below pond (and spillway) level. The pond is filled in to about a 2' depth at this point. The failure appear

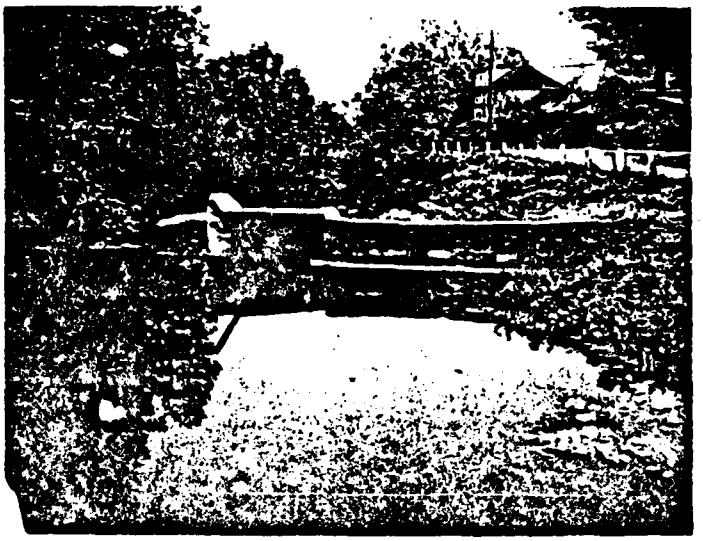
to be localized, however, it may extend below the fill in the bottom of the sluiceway. There is also spalling on the face of the wall and some surface cracking (rebar visible) at the downstream end. Recent surface concrete repairs were noted.

A small amount of water was leaking through the 3' opening in the headwall. The headwall shows significant leaching of lime and horizontal and diagonal cracking. There is a 6" ID iron pipe protruding from the headwall about 7' below its top. There was no flow from this pipe. The dry stone wall on the right side of the sluiceway shows some signs of instability and some backfill behind it has apparently washed through the cracks.

About 30' upstream of the dam a town road with a concrete box culvert (17' wide x 7'± x 19' long) crosses the pond. The top of the culvert is about 2' above the crest of the dam with the road surface another 2.5' above that. Although it has not been checked, it would appear that this bridge (culvert) rather than the dam controls higher flows. The cavity in the new sluice wall does not appear to be an immediate hazardous situation because it appears to be a localized failure of the concrete, however, it is still a serious defect and should be corrected at once. The concrete in the vicinity should be carefully examined, particularly below grade of the sluice bottom, to determine extent of the problem. If the cavity were to "blow out", it does not appear that it would affect the stability of the dam but would cause a serious leak.

vl

JACKSONVILLE POND DAM
WHITINGHAM
OCTOBER 6, 1978



CAVITY IN WALL

3' WIDE CRACK(?) OPENING

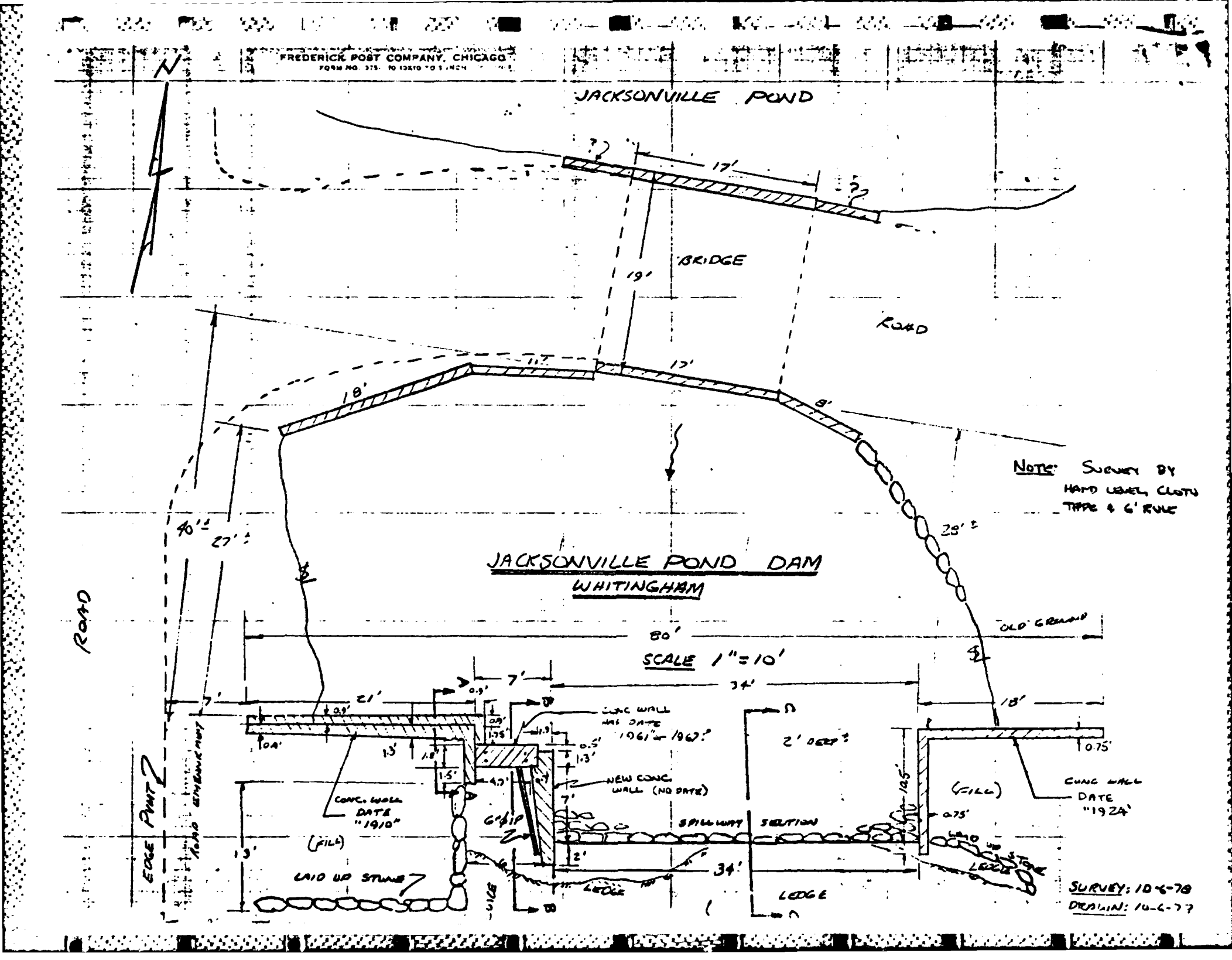
RECENT CONC. REPAIR

SPALLING CONCRETE

TOP OF 3' WIDE OPENING AS IS (CRACK?)

CAVITY IN WALL

RPR

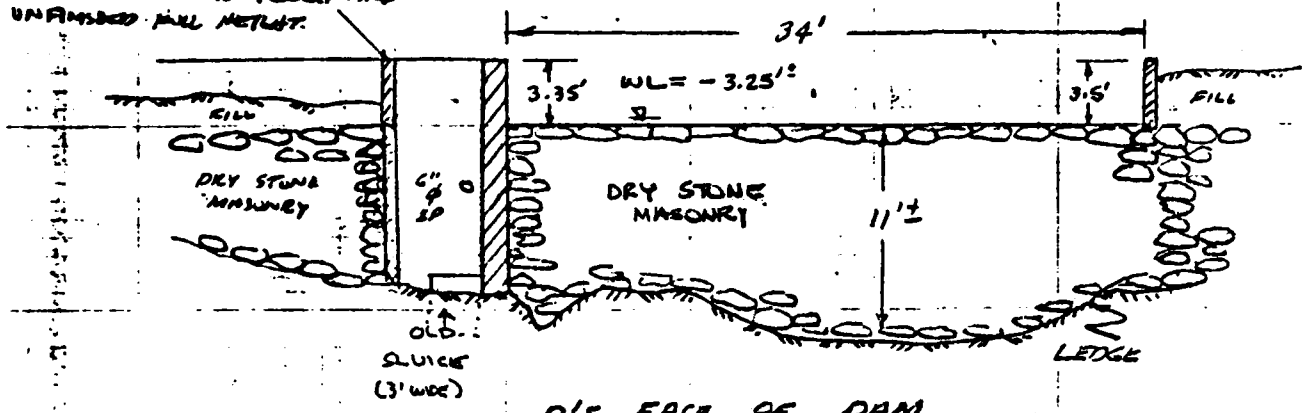

FREDERICK POST COMPANY, CHICAGO
FORM NO. 375 10 12X10 TO 1 INCH
N
JACKSONVILLE POND
17'
BRIDGE
19'
ROAD
11'
12'
18'
8'
40'±
27'±
28'±
NOTE: SURVEY BY HAND LEVEL, CLOTH TAPE & 6' RULE
JACKSONVILLE POND DAM
WHITINGHAM
ROAD
80'
OLD GROUND
SCALE 1"=10'
7'
34'
21'
0.9'
18'
CONC WALL HAS DATE 1961 or 1967
2' DEEP ±
0.75'
1.3'
1.8'
1.5'
4.7'
0.5'
NEW CONC WALL (NO DATE)
CONC. WALL DATE "1910"
6"ø PIP
7'
SPILLWAY SECTION
(FILL)
CONC WALL DATE "1924"
EDGE PAVT
ROAD EMBANKMENT
3'
LAID UP STONE
2'
34'
LEDGE
SURVEY: 10-6-76
DRAWN: 10-6-77

FREDERICK POST COMPANY, CHICAGO

JACKSONVILLE POND DAM

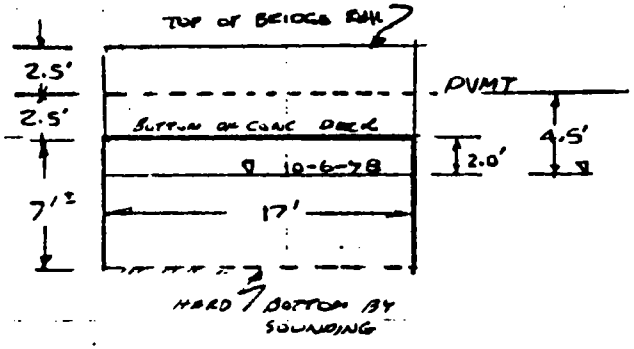
WHITINGHAM

D/S END OF WALL APPARENTLY WAS CUT OFF AS IT IS ROUGH AND UNFINISHED WALL METHAT.



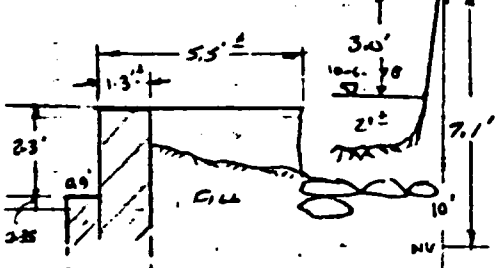
D/S FACE OF DAM

1" = 10' H&V



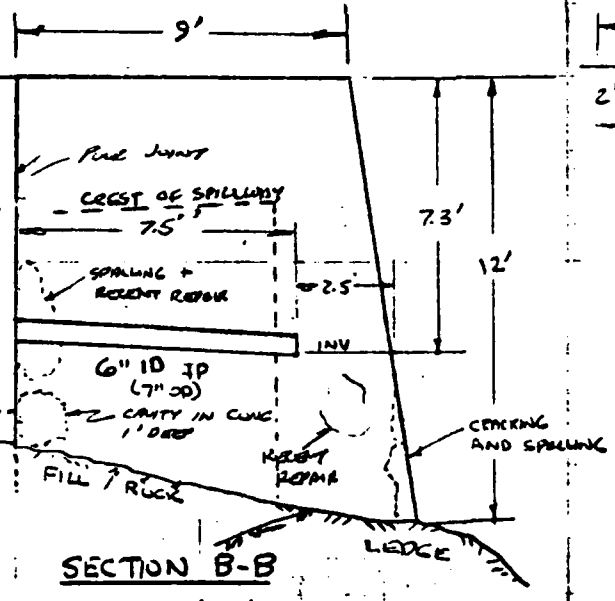
D/S BRIDGE OPENING

AREA OPENING = 119 D'±



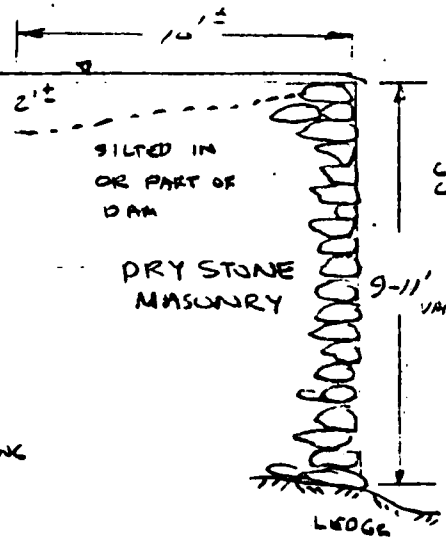
SECTION A-A

1"=5' H&V



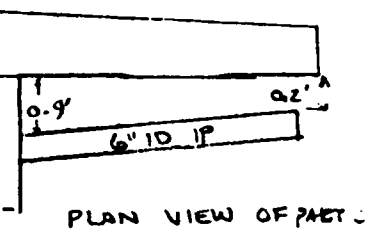
SECTION B-B

1"=5' H&V



SECTION C-C

1"=5' H&V



PLAN VIEW OF PART SLUICEWAY SHOWING OFFSET OF PIPE

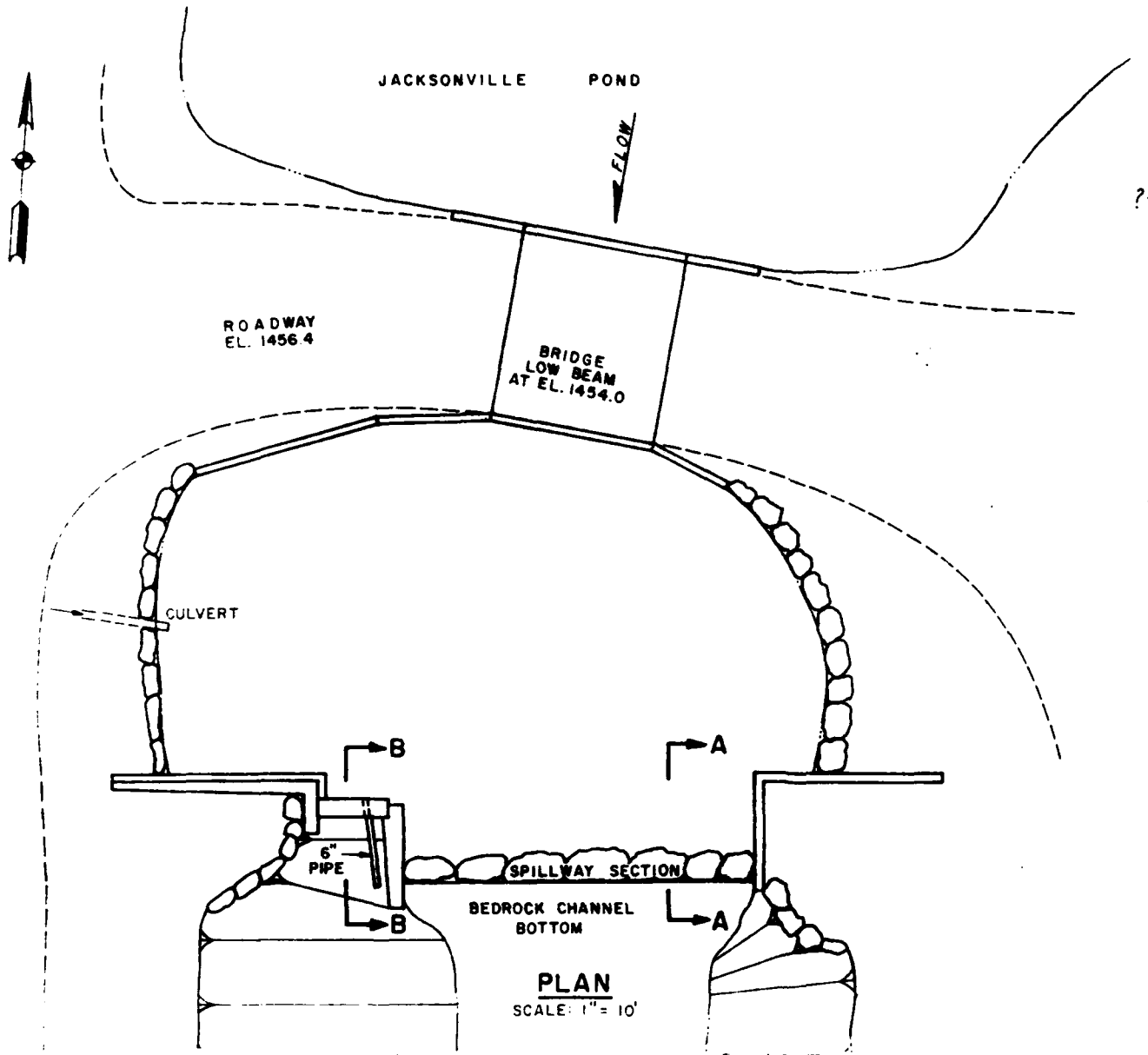
N.T.S.

OLD GATE STRUCTURE AND SLUICE -

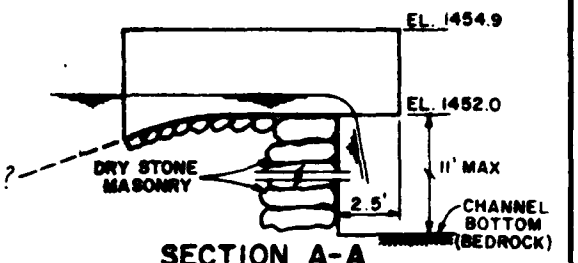
SURVEY: 10-6-78

DRAWN: 10-6-78

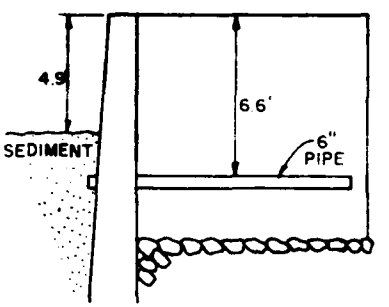
FIGURE 2



PLAN
SCALE: 1" = 10'



SECTION A-A
SCALE: 1" = 5'



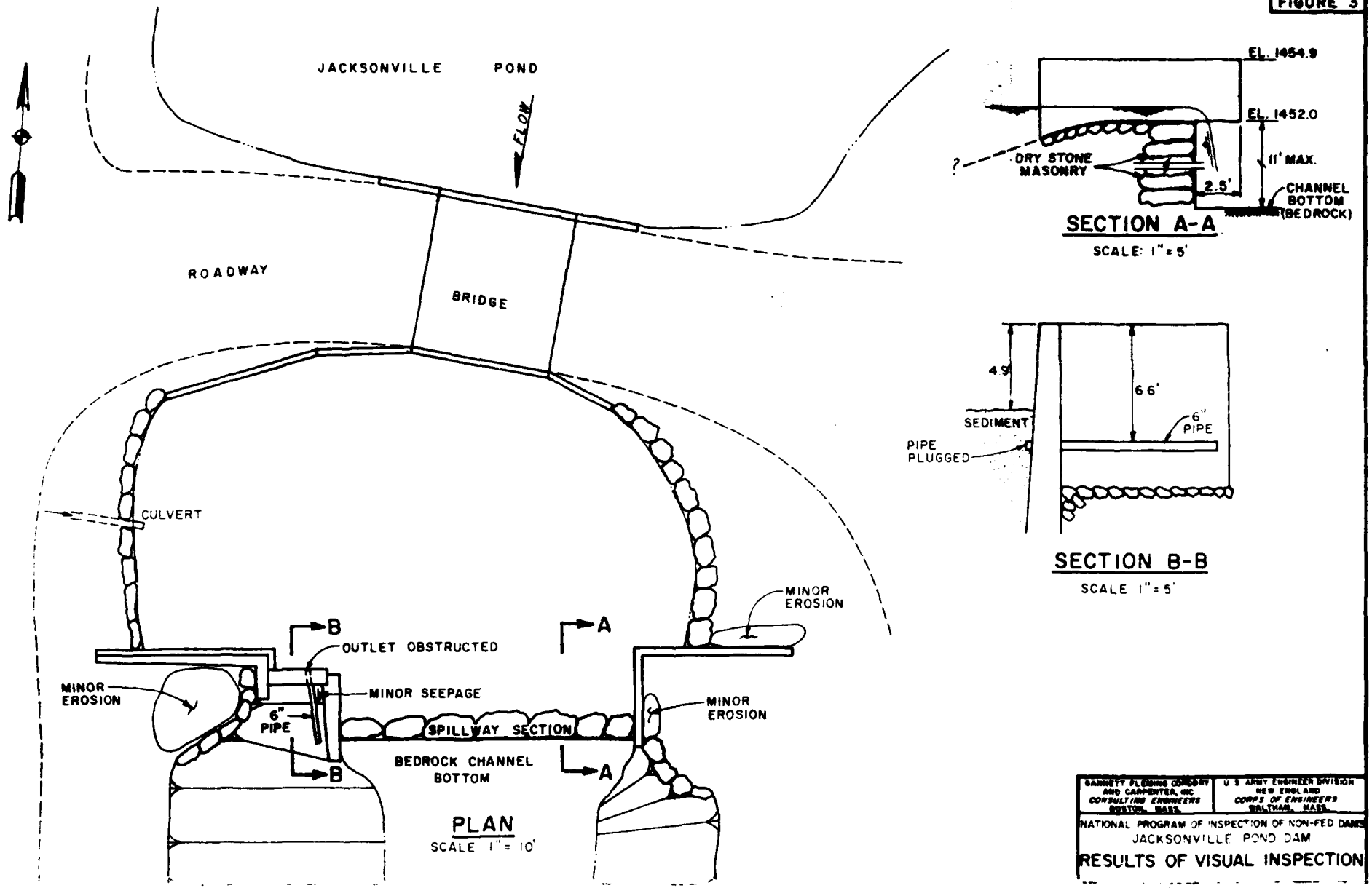
SECTION B-B
SCALE 1" = 5'

GANNETT FLEMING CORDRY AND CARPENTER, INC
CONSULTING ENGINEERS
BOSTON, MASS.

U S ARMY ENGINEER DIVISION
NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS
JACKSONVILLE POND DAM
PLAN AND SECTIONS

FIGURE 3



GARRETT FLEMING CORDRAY AND CARPENTER, INC. CONSULTING ENGINEERS BOSTON, MASS.	U.S. ARMY ENGINEER DIVISION NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

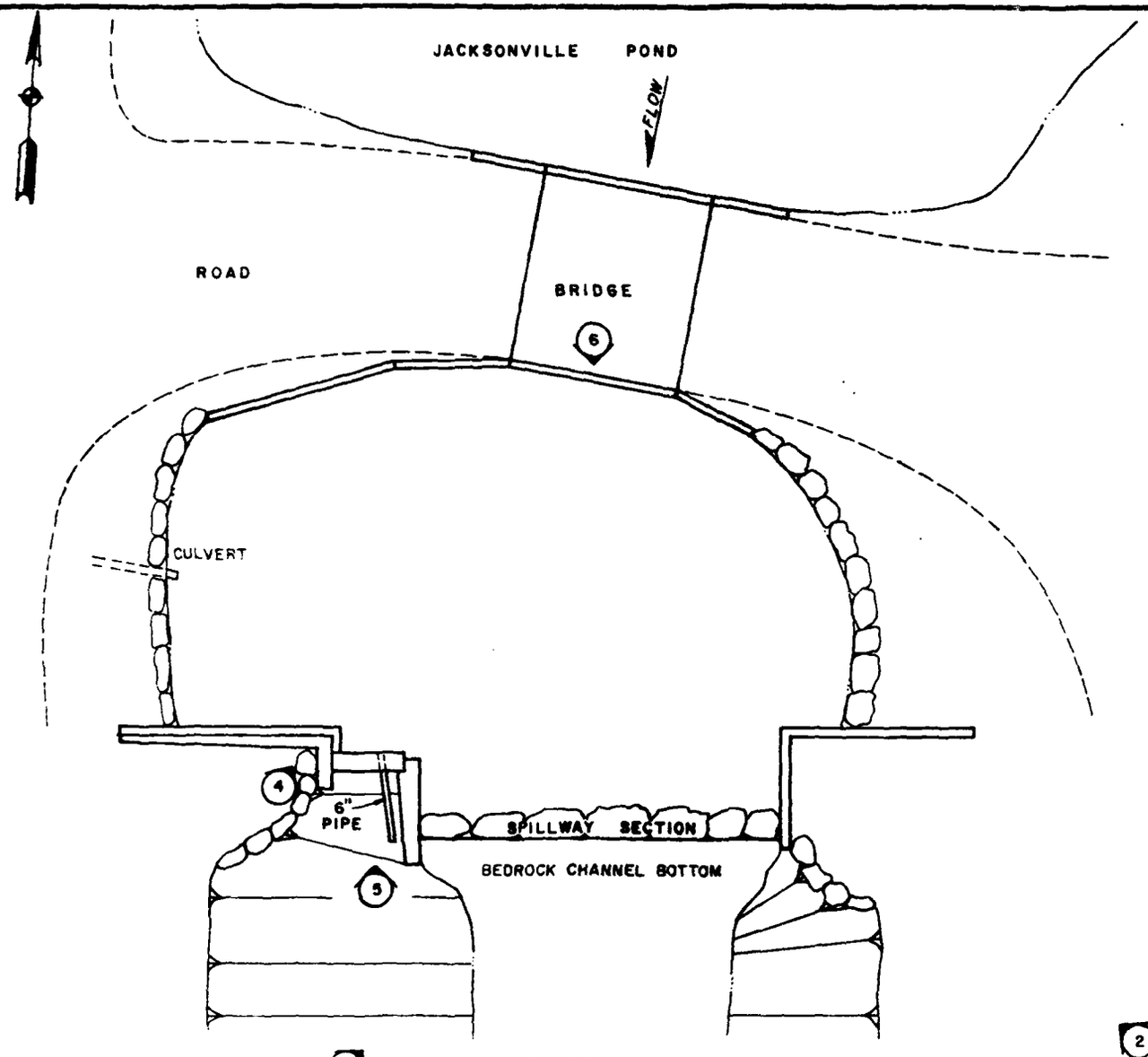
JACKSONVILLE POND DAM

RESULTS OF VISUAL INSPECTION

APPENDIX C

PHOTOGRAPHS

FIGURE 4



PLAN

(1) DENOTES PHOTO NUMBER AND DIRECTION IN WHICH PHOTO WAS TAKEN.

GANNETT FLEMING CORDRY AND CARPENTER, INC.
CONSULTING ENGINEERS
BOSTON, MASS.

U. S. ARMY ENGINEER DIVISION
NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

JACKSONVILLE POND DAM

GUIDE TO PHOTOGRAPHS

Photo No. 1

View from right abutment
Note minor erosion in area immediately downstream
of cut-off wall

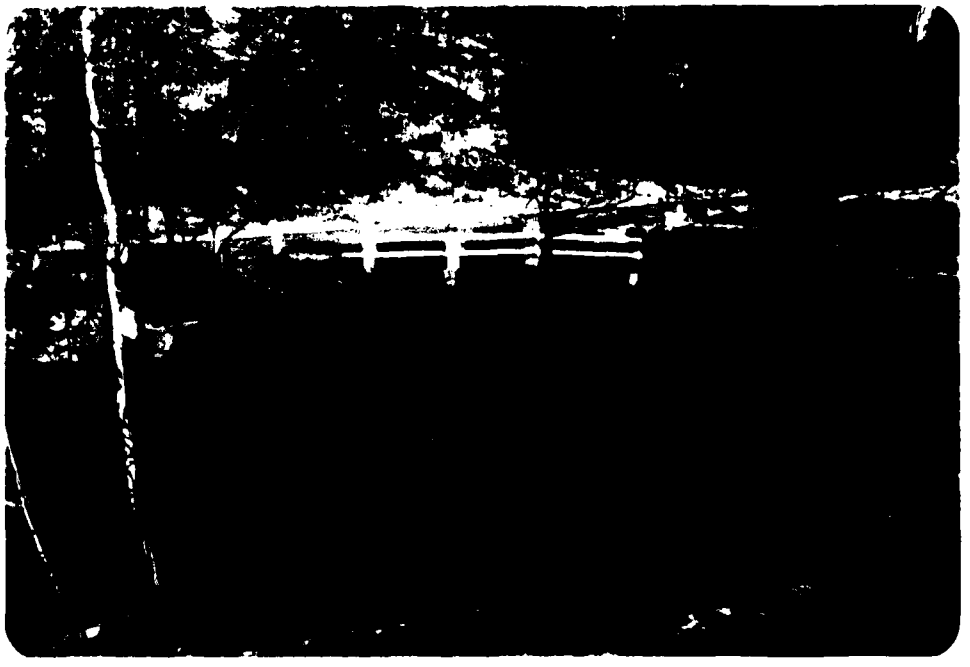


Photo No. 2

View from left abutment
Note large tree and minor erosion downstream
of cut-off wall

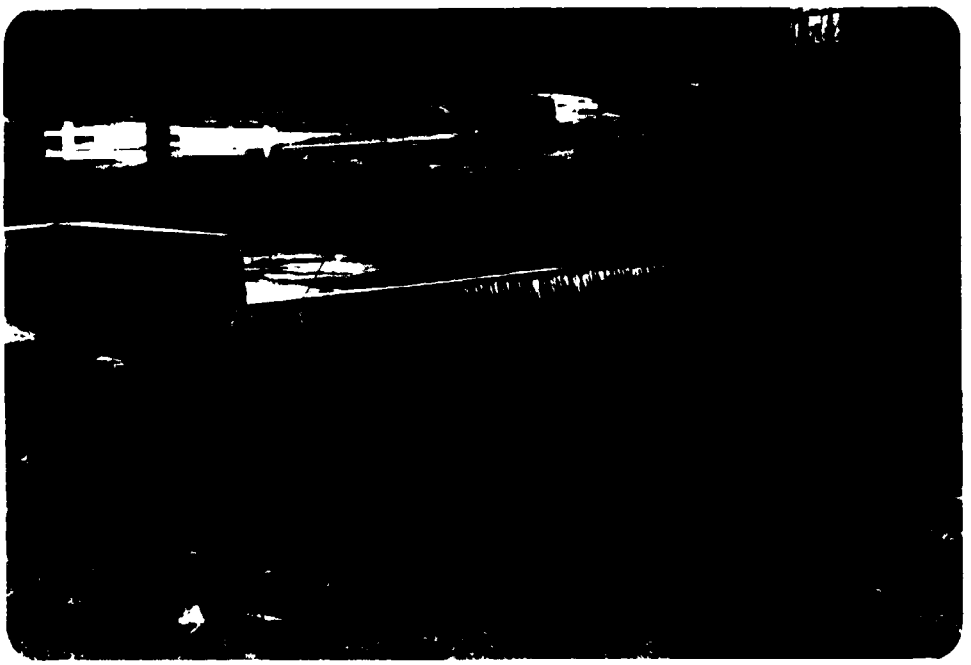


Photo No. 3

View of spillway section

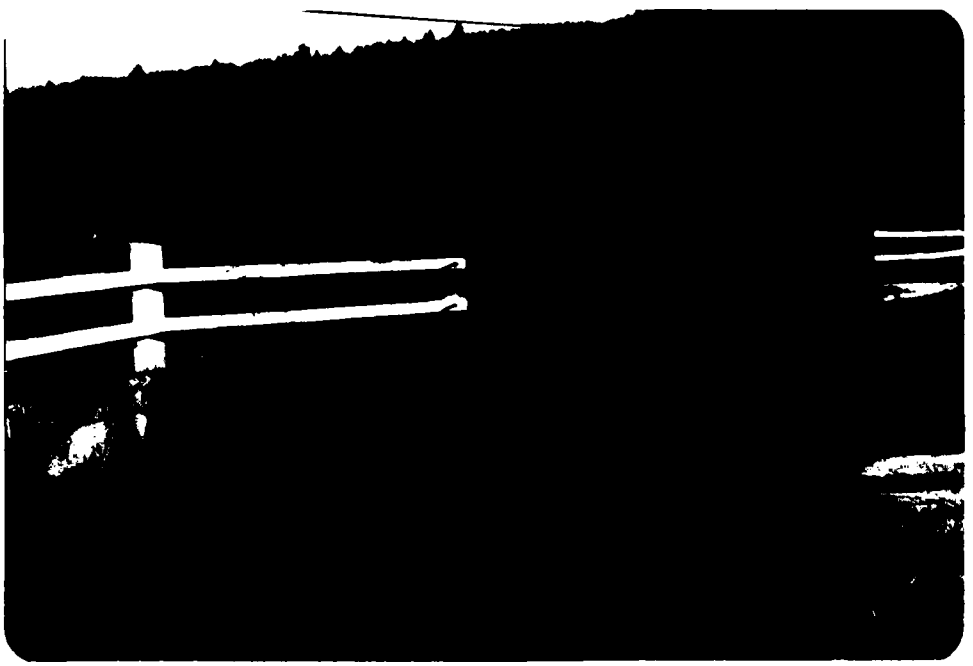


Photo No. 4

View of bridge above dam

Photo No. 5

View of inoperable outlet facility. Note concrete repairs and minor seepage.

Photo No. 6

View of downstream channel. Note old mill foundations.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

Jacksonville Pond Dam
Basic Data

Drainage Area = 5.29 mi^2 (determined from 15' USGS Quad)
Watershed Classification: Mountainous (Basin Slope 240 ft/mile)
Size: Small (13.7 feet high; maximum storage = 120 acre-feet)
Hazard Classification: High hazard
Reservoir surface area = 15 acres (at normal pool)
Storage capacity:
- Spillway crest level (Elev. 1452.0): 69 acre-ft
- Top of dam level (Elev. 1454.9): 120 acre-ft
- Top of upstream roadway level (Elev. 1456.4): 135 acre-ft

Spillway weir: concrete; 8.7 feet wide
length = 33.8 feet

Test Flood Inflow

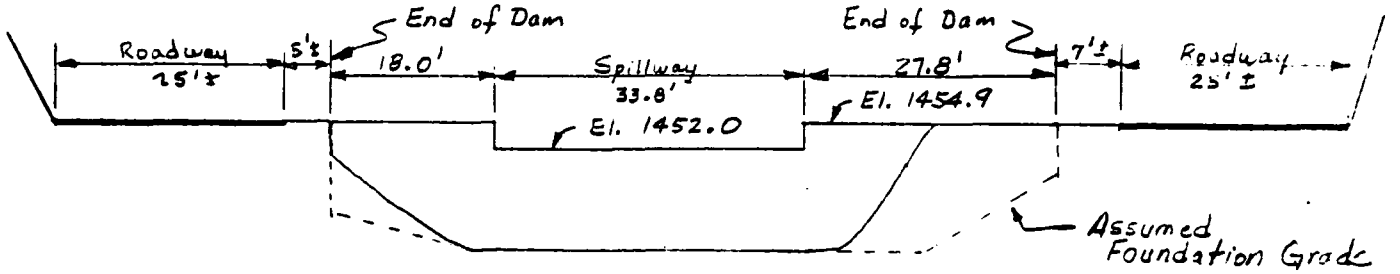
For size (small) and hazard classification (high), the recommended test flood ranges from the 1/2 PMF to the PMF. Because of the number of houses subject to potential flooding (approx. 12) and due to their close proximity to the dam and to the stream, the PMF is selected as the test flood for the analysis.

The effects of 2 upstream lakes, Laurel Lake and Gates Pond, were judged to be of minor significance in the analysis of Jacksonville Pond Dam, and they were not included in the analysis.

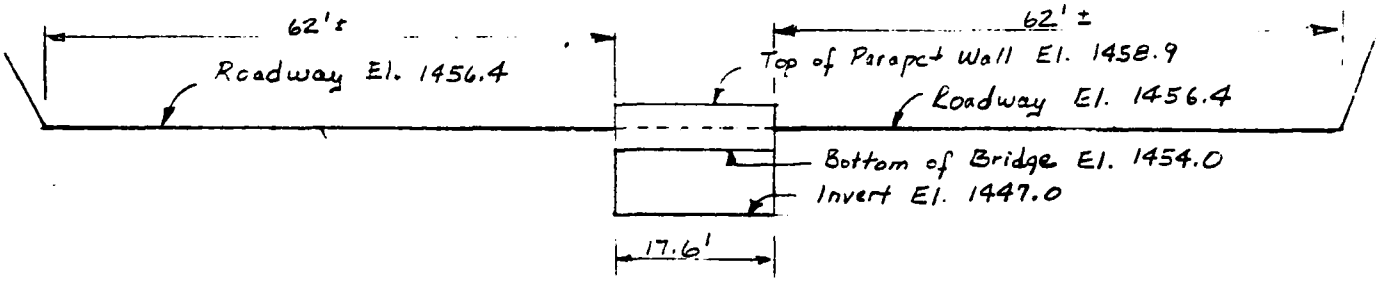
Using the curve for mountainous regions and for D.A.: 5.29 mi^2:

Test Flood Inflow = Q_{P1} = (5.29 mi^2)(2200 cfs/mi^2)
Q_{P1} = 11,638 cfs (PMF)

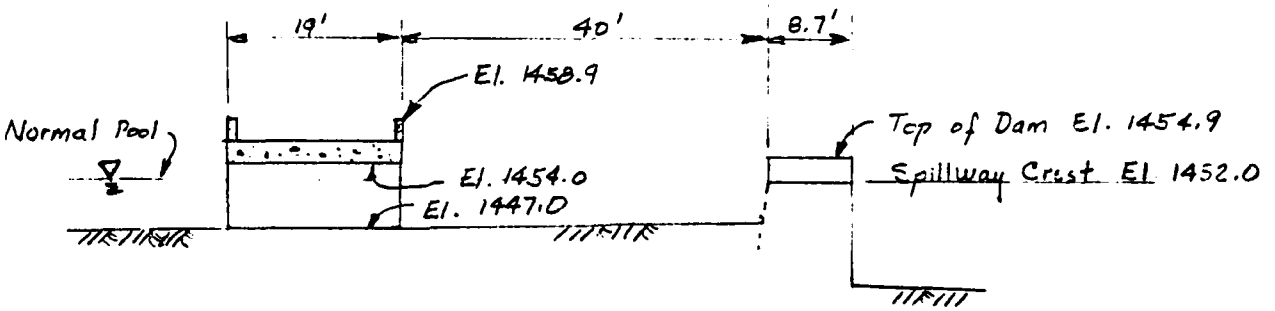
1/2 PMF = 5,819 cfs



Profile Along Top of Dam
1" = 20'



Profile - Roadway and Bridge Opening Upstream from Dam
1" = 20'



Section Through Bridge and Spillway
1" = 20'

Note: See Appendix B for plan views of dam and roadway.

Notes on Development of Rating Curve:

1. Spillway controls at low flows
2. Roadway culvert develops pressure flow when pool level at dam exceeds El. 1454.0
3. After pressure flow develops in culvert, differential water levels will exist.
4. Overtopping of dam and 2 adjacent roadways are included in analysis.
5. Overtopping of upstream roadway is included in development of overall rating curve.

Basic Data for Developing Rating Curve:

Spillway:

Length = 33.8' C = 2.9 Crest El. = 1452.0

$Q_S = (2.9)(33.8)(H_S)^{3/2}$

Dam and Two Adjacent Roadways:

Total length = 107.8 C = 2.5 Elevation = 1454.9

$Q_D = (2.5)(107.8)(H_D)^{3/2}$

Upstream Roadway Culvert:

Area = 123.2 ft^2 Pressure Flow

$Q_C = (0.7)(123.2)\sqrt{2g h_c}$ (Orifice eqn.; C = 0.7)

Upstream Roadway Embankment:

Length = 124' C = 2.5 Elevation = 1456.4

$Q_R = (2.5)(124)(H_R)^{3/2}$

Rating Curve - Jacksonville Pond Dam

Pool Elev. @ Dam	Q_s	Q_o	Q_{s+o}	h_c* Required	Pool Elev. @ Upstream side Bridge	Q_c	H_R	Q_R	Q_{c+R}
1452.0	0	0	0						
1453.0	98	0	98						
1453.5	180	0	180						
1454.0	277	0	277	0.16	1454.2	277	0	0	277
1454.9	484	0	484	0.49	1455.4	484	0	0	484
1455.3	588	68	656	0.90	1456.2	656	0	0	656
1455.4	615	95	710	1.05	1456.45	710	0.05	3	713
				Trial h_c	Trial U/S Elevations	Q_c	H_R	Q_R	Trial Q_{c+R}
1456.0	784	311	(1095)	1.4	1457.4	819	1.0	310	1129
				1.3	(1457.3)	789	0.9	265	1053
1457.0	1096	820	(1916)	1.6	(1458.6)	875	2.2	1011	1886
				1.7	1458.7	902	2.3	1081	1983
1458.0	1441	1471	(2912)	2.0	1460.0	979	3.6	2117	3096
				1.9	1459.9	954	3.5	2030	2983
1460.0	2218	3104	(5322)	2.0	1462.0	979	5.6	4108	5087
				2.1	1462.1	1003	5.7	4219	5222
1462.0	3100	5100	(8200)	2.5	1464.5	1094	8.1	7146	8240
1464.0	4075	7400	(11475)	3.0	1467.0	1200	10.6	10700	11900
				2.8	1466.8	1158	10.4	10397	11555

0.4

* h_c required is head on culvert necessary to match Q_{s+o}

$h_c = Q^2/0.98\,gA^2$ (From $Q_c = 0.7\,A\sqrt{2gh_c}$)

BY 0/DW DATE 12/80
CHKD BY [illegible] DATE 12/80
SUBJECT Jacksonville Pond Dam Hydrology and Hydraulics
JOB NO
SHEET NO 4 OF 10

Develop Routing Curve

Based on combined rating curve computations, it appears that the dam would fail before the upstream roadway embankment. For example, when dam is overtopped by 1.1 feet, roadway embankment is overtopped by only 0.9 foot. Visual inspection indicates that the roadway embankment would be more resistant to overtopping because it is paved. If the dam were to fail, it is judged that the sudden drawdown condition that would exist for the downstream side of the roadway would cause failure of the roadway embankment. Storage figures for the routing curve should be adjusted to account for the roadway embankment.

Storage above spillway crest is computed as a vertical prism based on a lake surface area of 15 acres. Computations are started with water at spillway crest level.

$$Q_{p2} = Q_{p1}\left(1 - \frac{Stor}{19}\right) \qquad Stor = \text{Storage in inches}$$

$$Stor = \frac{\text{Storage (acre-ft)} \times 12}{5.29 \times 640} = 0.00354 \times \text{Storage (acre-ft)}$$

Routing Curve

Pool Elev. @ Dam	Pool Elev. @ Roadway	Storage (acre-ft)	Stor (inches)	Q_{p2}
1452.0	1452.0	0	0	11638
1453.0	1453.0	15	0.05	11605
1454.0	1454.2	33	0.12	11566
1455.4	1456.5	67.5	0.24	11491
1457.0	1458.6	99	0.35	11424
1460.0	1462.1	151.5	0.54	11309
1464.0	1466.8	222	0.79	11156

$Q_{p1} = 11{,}638$ cfs

BY DPW DATE 12/80 SUBJECT Jacksonville Pond Dam SHEET NO 6 OF 10
CHKD BY [illegible] DATE 12/80 Hydrology and Hydraulics JOB NO

Routing Curve for 1/2 PMF Test Flood

$$Q_{p2} = Q_{p1}\left(1 - {}^{Stor}/_{9.5}\right) \qquad Q_{p1} = 5819 \text{ cfs}$$

Routing Curve

Pool Elev. @ Dam	Pool Elev. @ Roadway	Storage (acre-feet)	Stor (inches)	Q_{p2}
1452.0	1452.0	0	0	5819
1454.0	1454.2	33	0.12	5745
1457.0	1458.6	99	0.35	5605
1460.0	1462.1	151.5	0.54	5488
1464.0	1466.8	222	0.79	5335

From Results Shown on Figure 1:
Depth overtopping for 1/2 PMF = 5.2'
Depth overtopping for PMF = 8.9'

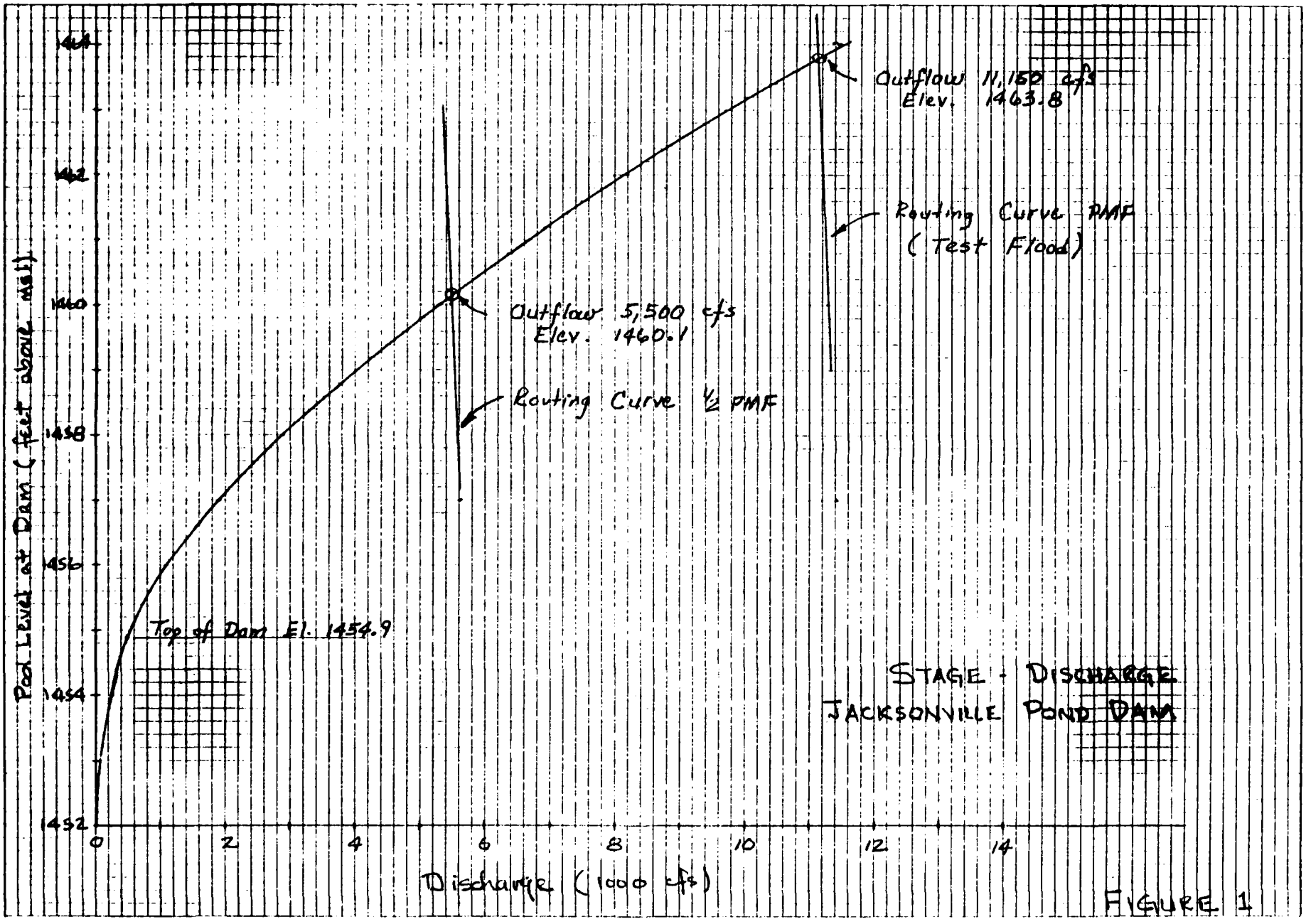

Outflow 11,150 cfs
Elev. 1463.8
Routing Curve PMF
(Test Flood)
Outflow 5,500 cfs
Elev. 1460.1
Routing Curve ½ PMF
Top of Dam El. 1454.9
STAGE - DISCHARGE
JACKSONVILLE POND DAM
Pool Level at Dam (feet above msl)
1462
1460
1458
1456
1454
1452
0
2
4
6
8
10
12
14
Discharge (1000 cfs)

FIGURE 1

Dam Failure Analysis

For failure with pool level at top of dam:
Storage at time of failure = 120 acre-ft
Outflow just prior to failure = 484 cfs

Breach outflow:

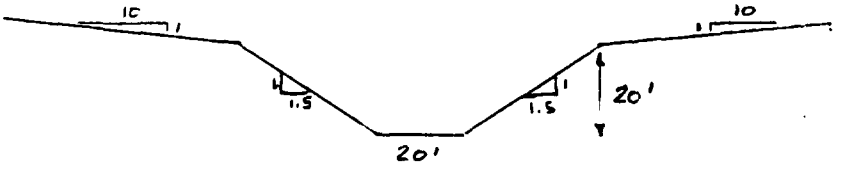
$$Q_B = 8/27\ W_b \sqrt{g}\ Y_o^{3/2}$$

W_b = 40% of dam length @ midheight = 32 feet
Y_o = 13.7 feet

$$Q_B = (8/27)(32)(32.2)^{1/2}(13.7)^{3/2} = 2728 \text{ cfs}$$

Breach occurs at spillway section. Since length of spillway = 33.8' and W_b = 32', remaining spillway flow is negligable and $Q_{P1} = Q_B$ = 2726 cfs.

Rating Curve: Reach 1



Reach Length = 750'
S = 0.105
$n_{channel}$ = 0.05
$n_{overbank}$ = 0.07

Stage (ft)	Q (cfs)
2	631
3	1271
5	3141
7	5831
10	11530

Reach Outflow : Reach 1

Pre-failure stage ($Q_{spillway}$ = 484 cfs) = 1.7'
Pre-failure flow area in channel = 38.3 ft²

Q_{P_1} = 2728 L = 750' S = 120 acre-ft
Stage for Q_{P_1} = 4.7' Area = 127.1 ft²
Δ Area = 127.1 − 38.3 = 88.8 ft²

$V_1 = (750\text{ ft})(88.8\text{ ft}^2)\left(\frac{1\text{ acre}}{43560\text{ ft}^2}\right) = 1.5$ acre-ft $\left(1.5 < 120/2 \text{ Reach length OK}\right)$

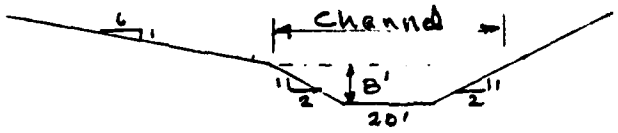
$Q_{P_2} = Q_{P_1}\left(1 - V_1/S\right) = 2728\left(1 - 1.5/120\right) = 2694$ cfs

Stage for Q_{P_2} = 4.6' Area = 123.7 ft²
Δ Area = 123.7 − 38.3 = 85.4 ft²

$V_2 = \frac{(750)(85.4)}{43560} = 1.5$ acre-ft (same as V_1)

∴ Q_{P_2} = 2694 cfs

Rating Curve : Reach 2



Reach length = 750'
S = 0.070
n channel = 0.05
n overbank = 0.07

Stage (feet)	Q (cfs)
2	531
5	2759
8	6821

Reach Outflow: Reach 2

Pre-failure stage ($Q = 484$ cfs) = 1.9' (Area = 45.2 ft²)

$Q_{P1} = 2{,}694$ cfs (Q_{P2} from reach 1)

Stage for Q_{P1} = 4.9' Area = 146.0 ft²

Δ Area = 146.0 − 45.2 = 100.8 ft²

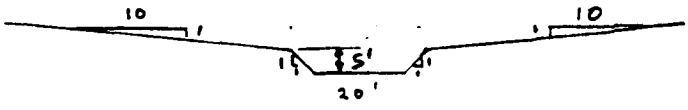
$V_1 = \frac{(750')(100.8)}{43560} = 1.7$ acre-ft ($1.7 < 120/2$ Reach length OK)

$Q_{P2} = 2694\,(1 - 1.7/120) = 2{,}656$ cfs

Stage = 4.9' (same as above, so $V_2 = V_1$)

$Q_{P2} = 2{,}656$ cfs

Rating Curve: Reach 3



L = 1500'
S = 0.025
$n_{channel}$ = 0.05
$n_{overbank}$ = 0.07

Stage (feet)	Q (cfs)
2	298
3	588
5	1405
7	2839

Reach Outflow: Reach 3

Pre-failure stage ($Q = 484$ cfs) = 2.7' (Area = 61.3 ft²)

$Q_{P1} = 2{,}656$ cfs (Q_{P2} from reach 2)

Stage for Q_{P1} = 6.8' Area = 211.4 ft²

Δ Area = 211.4 − 61.3 = 150.1 ft²

$V_1 = \frac{(1500)(150.1)}{43560} = 5.2$ acre-ft ($5.2 < 120/2$ Reach length OK)

$Q_{P2} = (2656)(1 - 5.2/120) = 2{,}541$ cfs

Reach Outflow : Reach 3 Cont'd

Stage for Q_{p_2} = 2541 cfs is 6.6' Area = 198.6 ft²

Δ Area = 198.6 − 61.3 = 137.3 ft²

$$V_2 = \frac{(1500)(137.3)}{43560} = 4.7 \text{ acre-ft}$$

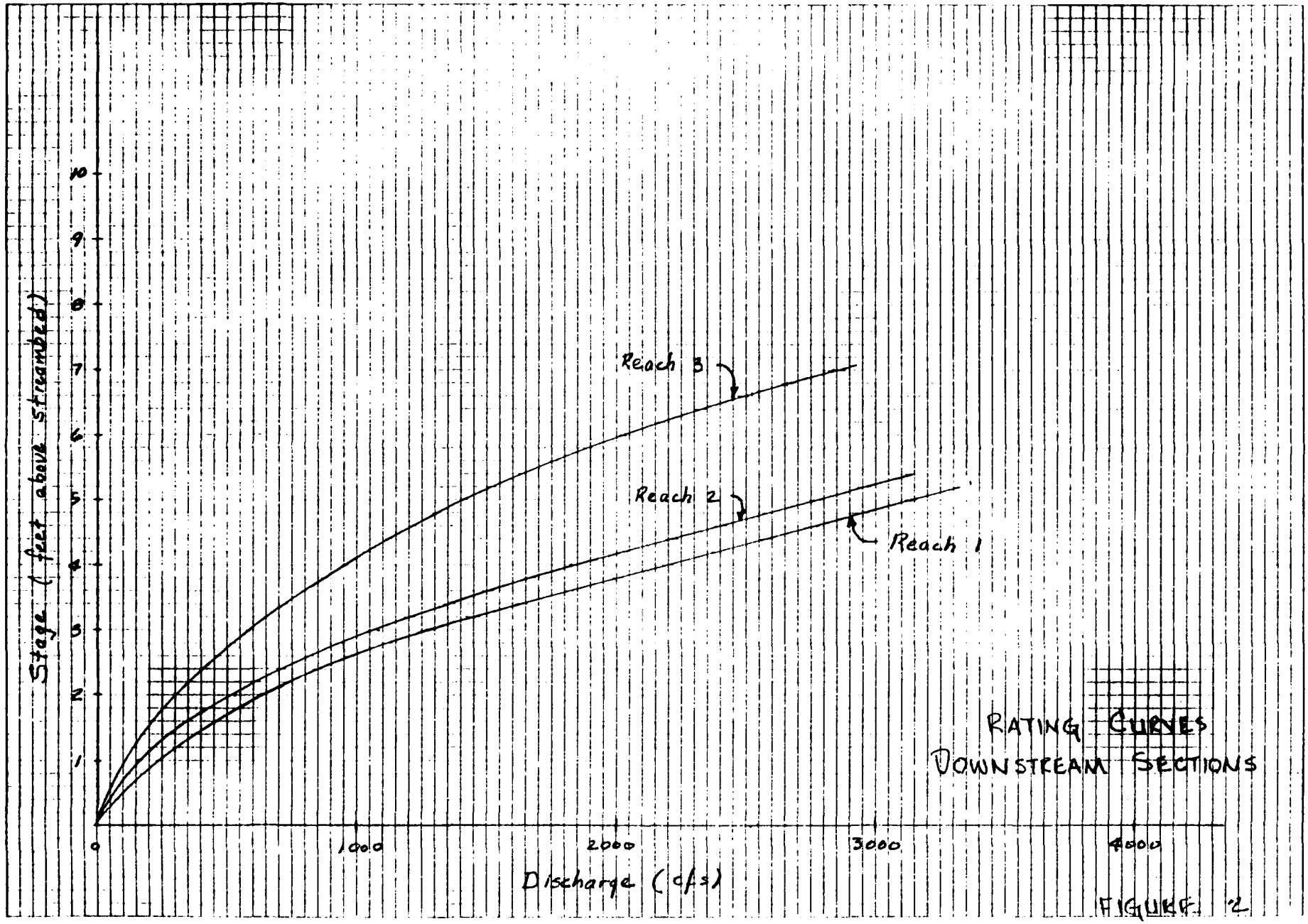
$$V_{avg} = \frac{4.7 + 5.2}{2} = 4.95 \text{ acre-ft}$$

$$Q_{p_2} = Q_{p_1}\left(1 - V_{avg}/S\right) = 2656\left(1 - 4.95/120\right)$$

Q_{p_2} = 2546 cfs

Stage = 6.7 feet

Rise in stage at damage center due to dam failure is 4.0'. Maximum stage during failure is 6.7'. Approximate velocity is 12.7 fps. First floor level of houses is at stage = 5.0 feet. Due to flow depth and velocity, high hazard classification is warranted.



RATING CURVES
DOWNSTREAM SECTIONS

FIGURE 2

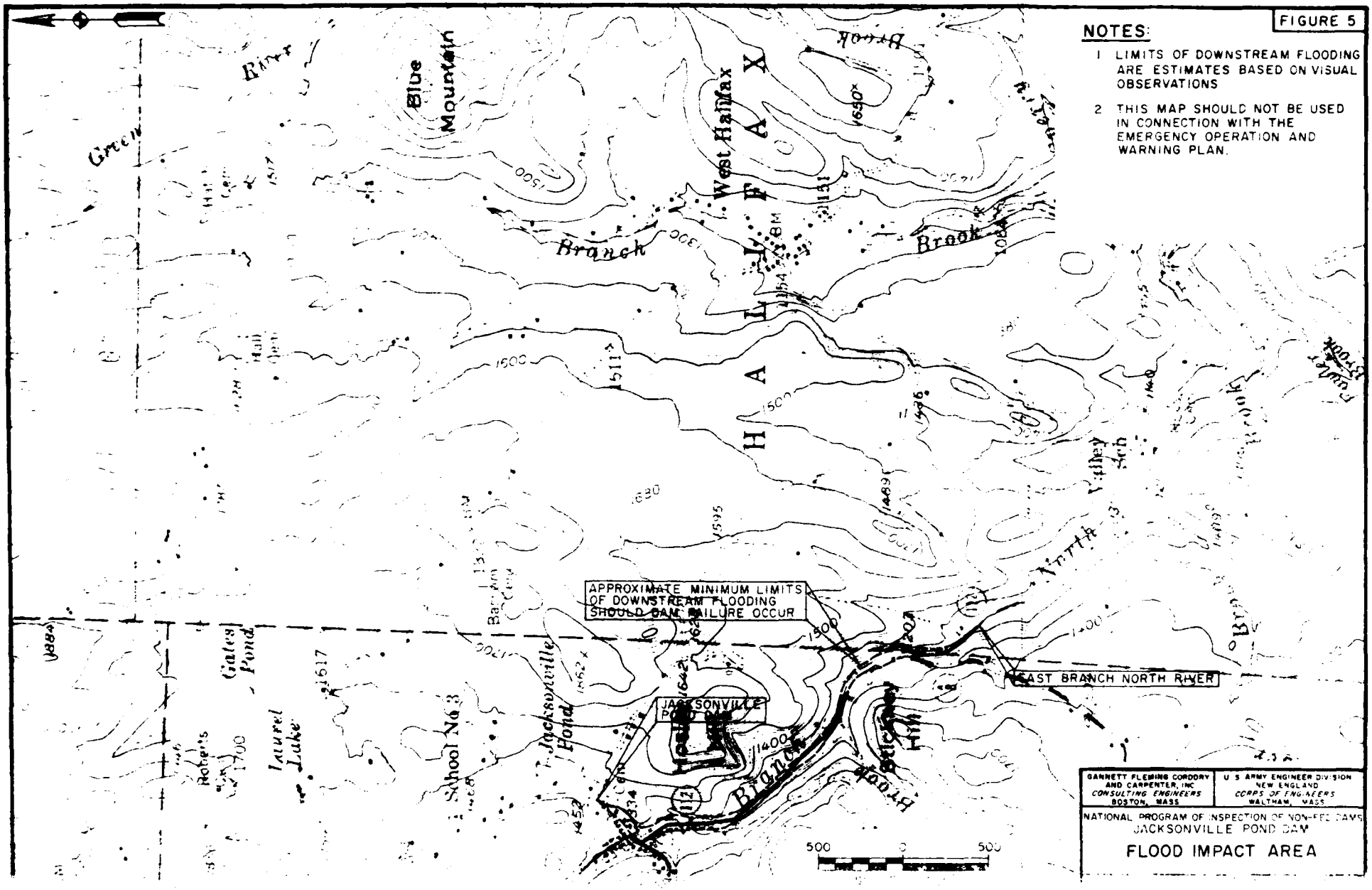


FIGURE 5
NOTES:
1 LIMITS OF DOWNSTREAM FLOODING ARE ESTIMATES BASED ON VISUAL OBSERVATIONS
2 THIS MAP SHOULD NOT BE USED IN CONNECTION WITH THE EMERGENCY OPERATION AND WARNING PLAN.
APPROXIMATE MINIMUM LIMITS OF DOWNSTREAM FLOODING SHOULD DAM FAILURE OCCUR
JACKSONVILLE POND DAM
EAST BRANCH NORTH RIVER
Blue Mountain
West Halifax
Gates Pond
Laurel Lake
Jacksonville Pond
School No 3
North Valley Rd
500 0 500
GANNETT FLEMING CORDDRY AND CARPENTER, INC CONSULTING ENGINEERS BOSTON, MASS
U S ARMY ENGINEER DIVISION NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS
JACKSONVILLE POND DAM
FLOOD IMPACT AREA

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME

END

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